

REMARKS/ARGUMENTS

Specification

The specification has been amended on page 5 to identify liquid waste outlet 24 as a lower liquid waste outlet and to identify liquid outlet 25 as an upper liquid outlet and on page 6 to identify liquid outlet 36 as upper liquid outlet.

The specification has also been amended on page 13 to describe the direct piping connection 62 in Fig. 1 from the lower liquid waste outlet to the storage tank and the direct piping connection 64 from the upper liquid waste outlet to the storage tank.

It is submitted that the amendments to the specification on pages 5, 6 and 13 do not add any new matter to this specification since they simply describe what is clearly shown in Fig. 1 of the drawings.

Amendments to the Drawings

Fig. 1 of the drawings has been amended to identify the direct piping connection from the lower liquid outlet of the mist separating apparatus with the reference numeral 62 and to identify the direct piping connection from the upper liquid outlet of the mist separating apparatus with the reference numeral 64. These numerals have been added in the amendment to the specification on page 13. It is respectfully requested that these amendments to Fig. 1 of the drawings be approved.

Rejection of Claims Under 35 U.S.C. §112, First Paragraph

Claims 3-4, 11-14 and 16-17 stand rejected under 35 U.S.C. §112, first paragraph, for allegedly failing to comply with the written description requirement for the reasons set forth on pages 2 and 3 of the Office Action. These claims have been further amended in a manner which is believed to satisfy all the requirements of 35 U.S.C. § 112.

The Examiner's attention is specifically directed to the fact that the claims have been amended to delete "mist removal means" and only define the mist removal means as being "comprised of a cyclone type mist separator that removes mist by centrifugal force or a filter type mist separator that removes said mist by filtering through a plurality of overlapping filters." Claim 13 refers only to the cyclone separator.

On page 2 of the Action, the Examiner acknowledged that there is support for the cyclone mist separator as a mist removal means with two liquid outlets therefore as shown in Figs. 2(A) and (B). The Examiner however stated that "There is no disclosure in the instant specification or in Figures 3-4 that there were 2 liquid outlets for the filter mist generator or the electric dust generator".

Applicant agrees that there are not two liquid outlets shown for the electric dust generator and the claims now do not refer to the electric dust generator. Applicant's, however, strongly disagree with the Examiner that two liquid outlets are not shown for the filter mist generator.

The filter type mist separator is described from page 6, line 15 to page 7, line 16 of the specification and in Fig. 3. As described therein, the mist removal means corresponds to the filters 32 and 33 thereof. As described on page 7, lines 1-16 of

the specification, filters remove mist from the gas passing there through. The portion of the mist removed by the filters 32 and 33 drops to the bottom of the lower chamber of the filter type separator shown in Fig. 3 and is removed out through an outlet at the bottom thereof labeled "FROM EXHAUST GAS WASHING TOWER 13". In Fig. 3, for simplicity a separate outlet for liquids discharged at the bottom of the lower chamber is not specifically shown. As shown in Fig. 1, and as described on page 13 of the specification, however, a direct piping connection 62 connects the bottom of the mist removal device 21 directly with liquid waste storage tank 18. This constitutes a clear teaching and support for a second liquid outlet in the lower stage of the filter separator of Fig. 3. Moreover, another liquid outlet 36 is provided at the entry end of the rear stage or upper compartment of the filter separator shown in Fig. 3 which provides an outlet for a liquid still contained in the mist which passes through the filters and pools at the bottom of the rear stage or upper compartment.

Applicants also disagree with the Examiners contention on page 3 of the Office Action that there is no support in the specification for the "two-step decomposing process".

It is evident that, as shown in Fig. 1 and as described in the specification at page 11, line 12 to page 12, line 10, the PFC decomposition tower 1 has the PFC decomposition catalyst 8 on the upstream side of the exhaust gas flow and the hazardous component removing catalyst 9 on the down stream side of the exhaust gas flow below the catalyst 8. This clearly indicates that PFV is decomposed first at the PFC decomposition catalyst 8 into hazardous substances such as SO₃, HF, NO, NO₂, CO, SO₂F₂, and then such substances are decomposed at the hazardous component removing catalyst 9.

Therefore, the "two-step decomposition" in the present invention is clearly supported by the specification.

Patentability of the Claims

Independent method claims 3, 4, 11, 13, 14 and 17 have amended to further define the liquid waste outlets as a lower liquid waste outlet and an upper liquid waste outlet of the mist separating apparatus. The claims have also been amended to further define a step of draining the liquids discharged from each of the lower liquid waste outlet and upper liquid waste outlet on the mist separating apparatus through separate direct piping connections to a storage tank. These amendments further define over the cited prior art.

In the present invention, as Fig. 1 of the specification illustrates, a mist-containing gas is fed from the gas washing tower 13 to the mist separating apparatus 21, then the mist-removed gas is emitted from the upper side of the mist separating apparatus 21 with the mist removed, while waste water is discharged from the mist separating apparatus 21 into a storage tank 18 through direct piping connections 62 and 64 thereto provided at a bottom of and on a side of the mist separating apparatus 21.

The cyclone type mist separator shown in Fig. 2 of the present specification has direct piping connections to the storage tank 18. One piping is connected to the lower liquid outlet 24 in the lower portion of the separator and the other is connected to the upper liquid outlet 25 on the side portion thereof. The filter type mist separator shown in Fig. 3 of the present specification also has direct piping connections 62 and 64 to the storage tank 18. One piping is connected to the lower portion of the

separator at the portion labeled "FROM EXHAUST GAS WASHING TOWER 13", and the other is connected to the liquid outlet 36 in the side portion thereof. For simplicity, a separate outlet for liquids in the lower portion of the filter separator is not specifically shown but Fig. 1 clearly shows piping 62 connected to the bottom of the mist separating apparatus 21.

Thus, the waste water is discharged from each liquid outlet into the storage tank 18 through these direct piping connections.

As stated above, the waste water is discharged from each liquid outlet into the storage tank 18 through direct piping connections thereto provided at the bottom of and on the side of the mist separating apparatus 21. Because the separated mist contains a corrosive component in a concentrated form, the waste water is discharged as the waste water 20 without being returned to the gas washing tower 13 so that the corrosive component included in the gas exhausted from the gas washing tower 13 will not increase, with corrosion of the mist separating apparatus 21 suppressed.

The present invention achieves a greater removal of mist and therefore considerably reduces corrosion of the exhaust pipe and the exhaust blower and minimizes the atmospheric emission of those substances such as HF, SO₃, and NO that are partial substance of decomposition products with reduced affection to the environment.

In considering the patentability of the method claims of the present application, the apparatus limitations for carrying out the method, as now set forth in the amended claims, must be given proper consideration.

The features in the present invention as now related in the amended method claims are not described or suggested in any of the cited references, taken either in combination or alone, as discussed hereafter.

EP '648 discloses a gas washing tank 20, which corresponds to the gas washing tower 13 in the present invention. Below the tank 20, the EP '648 also discloses a storage tank, which corresponds to the storage tank 18 in the present invention. The EP '648 reference, however, does not describe or suggest any mist separating apparatuses which remove mists from the exhaust gas emitted from the gas washing tank 20. Thus this reference does not include any teaching for the direct discharging of mist separated by a mist separating apparatus to the storage tank.

Therefore, the exhaust gas emitted from the gas washing tank 20 includes a substantial amount of mist. The mist and corrosive substances contained therein, such as HF, SO₃, and NO heavily corrode the blower 21 connected to the gas washing tank 20. As a consequence of the emission of such mist into the atmosphere, the environment is polluted.

The present invention is a significant improvement over the conventional mist treatment techniques and is not such an invention that a person skilled in the art can easily derive from the cited references.

The Examiner states that the demister 4 of Lang '256 is an apparatus that sprays H₂O and that this apparatus corresponds to the gas washing tower 13 in the present invention. Lang '256, however, does not describe or suggest any of the mist separating methods apparatuses that the present invention defines. Lang '256 does

not include any technique for the direct discharging of the mist separated by a mist separating apparatus to the storage tank.

The exhaust gas emitted from the gas washing tank includes substantial mist. Thus, the flue gas flow 17" emitted from the demister 4 includes mist and corrosive substances contained in the mist, such as HF, SO₃, and NO. These corrosive substances heavily corrode the blower or similar devices incorporated in the flue gas flow 17". As a consequence of the emission of such mist into the atmosphere with the Lang device, the environment is polluted.

In Lang '256, the demister 4 and the wet scrubber 2 are integrated in one unit, wherein the separated mist is returned, in a reverse flow, to the wet scrubber 2. Therefore, a storage tank or a discharging outlet such as that of the present invention is not provided. In contrast, the present invention provides a discharging outlet to flow such mist into the storage tank. This is a different feature from Lang '256 and the other cited art.

JP '455 discloses a gas washing tower 5, the detoxifying of an exhaust gas generated at the gas washing tower 5 through a cyclone type mist separator, and the exhausting of the detoxified exhaust gas. This reference does not, however, indicated the direct discharging of the mist separated at the mist separating apparatus, or a storage tank. JP'455 does not describe or suggest any concrete structure of the gas washing tower 5 or of the cyclone type mist separator.

In the present invention, the mist separated at the mist separating apparatus is flowed directly into the storage tank 18 without passing the gas washing tower 13. Then, the gas exhausted from the gas washing tower 13 is fed to the mist separating

apparatus 21 with corrosive components contained therein reduced. This enables lessening the corrosion in the mist separating apparatus 21 more.

Therefore, the present invention is not such an invention that a person skilled in the art would find obvious from the cited references. The composition, aim, and effect of the claimed invention are completely different from the cited art.

In addition to the discussion of the prior art references set forth above, Applicants comments concerning the prior art references set forth at pages 13-19 of the previous amendment filed August 25, 2006 hereby incorporate herein by reference.

U.S. Application No. 09/651,783
Response to Office Action Dated November 15, 2006
Response dated March 15, 2007

Attorney Docket: NIP-198

Conclusion

In view of the foregoing amendments and remarks, the Applicants request reconsideration of the rejection and allowance of the amended claims.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Mattingly, Stanger & Malur, P.C., Deposit Account No. 50-1417 (referencing attorney docket no. NIP-198).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.



Gene W. Stockman
Registration No. 21,021

GWS/na
(703) 684-1120



FIG. 1

